

REMARKS/ARGUMENTS

Favorable reconsideration of this application in light of the following discussion is respectfully requested.

Claims 1, 2, 4-7, 9 and 10 are pending in the present application. Claims 3 and 8 have been canceled without prejudice or disclaimer. Claims 1, 4, 6, and 9 have been amended support for which is found at least at page 12, lines 22-25. No new matter has been added.

By way of summary, the Official Action presents the following issues:

The Information Disclosure Statement filed December 18, 2006 has yet to be considered; and Claims 1-10 stand rejected under 35 U.S.C. § 103 as being unpatentable over Buchler (U.S. Patent No. 6,266,303, hereinafter Buchler).

IDS of December 18, 2006

The Official Action notes that the IDS filed on December 18, 2006 has not been considered as it allegedly fails to comply with 37 C.F.R. § 1.98(a)(2).

Applicants note that this Information Disclosure Statement was filed together with a translated (English language) version of the corresponding Japanese Office Action. In this regard, Applicants respectfully directed the Examiner's attention to MPEP § 609, which states:

Where the information listed is not in the English language, but was cited in a search report **or other action by foreign patent office in a counterpart foreign application**, the requirement for a concise explanation of relevance can be satisfied **by submitting an English-language version** of the search report **or action** which indicates the degree of relevance found by the foreign office. This may be an explanation of which portion of the reference is particularly relevant, to which claims it applies, or merely and "X", "Y", or "A" indication on a search report.¹

¹ MPEP § 609, page 600-129.

Applicants note that the English language version of the Japanese Office Action indicates the degree of relevance of the references cited in the IDS of December 18, 2006.

Therefore, Applicants have complied with their duty of disclosure under 37 C.F.R. § 1.98 and MPEP § 609². Accordingly, Applicants respectfully submit that the references cited in the IDS of December 18, 2006 are required to be considered and request indication of such in the next communication.

Rejections Under 35 U.S.C. § 103

The Official Action has rejected Claims 1-10 under 35 U.S.C. § 103 as being unpatentable over Buchler. The Official Action contends that Buchler describes all the Applicants' claim features, with the exception of a low-pass filter having a cut-off frequency being higher than a frequency at which a spectrum of a modulation code recorded in the optical disk becomes -10 dB and lower than a frequency at which the spectrum of the modulation code recorded in the optical disk becomes -5 dB. However, the Official Action notes that it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the aforementioned frequency cut-off frequency relationship to discover an optimum or workable range for arriving at the Applicants' claims. Applicants respectfully traverse the rejection.

By way of background, in reproducing signals provided to an optical disk, it is necessary to track an objective lens so that the laser beam does not stray from the series of pits or marks provided on the disk. To this end, a tracking error detection is utilized which detects reflected light from an edge of a mark or pit. Typically, a differential phase detection method is employed for identifying a tracking error signal. However, in the phase-difference

²Furthermore, it is believed that the U.S. PTO provides translation services for Examiners if the Examiner believes that a certain reference may be especially pertinent. Applicants encourage the Examiner to use these translation services should further information be desired consistent with examination guidelines.

detection signal, a high frequency component relative to a servo band must be removed by smoothing the phase-difference detection signal. In this way, a tracking error signal is generated according to a deviation between the laser beam and the series of pits. However, in disks which have a high recording density, the minimum mark length is shortened in order to increase the recording density. As such, the phase difference signal cannot be smoothed and the modulation component of the recording code included in the phase difference signal (the high frequency component relative to the servo band) remains as noise.³

In light of at least the above deficiencies in the art, the present advancements are provided. With at least the above objects in mind, a brief comparison of the claimed advancements, in view of the cited reference, is believed to be in order.

Applicants' amended Claim 1 recites, *inter alia*, a tracking error detection device for an optical disk using a modulation coding method in which a minimum value of a run-length is 1, the device including:

... a low-pass filter which smoothes an output of the phase comparing unit, a cut-off frequency of the low-pass filter being higher than a frequency at which a spectrum of a modulation code recorded in the optical disk becomes -10dB relative to a frequency component of a code before modulation and lower than a frequency at which the spectrum of the modulation code recorded in the optical disk becomes -5dB. (emphasis added)

Buchler describes an apparatus for reproducing/recording information to an optical recording carrier. As shown in Figure 1, a phase detector (14) for generating a track error signal (TE) utilizing a DPD method from summation signals. The phase detector (14) includes a phase comparator (20) which provides an output to filter (21).⁴ The cut-off frequency of the filter (21) is approximately 50 kHz. The track error signal (TE) is output from the filter (21) and provided to the filter (23). The filter (23) has a cut-off frequency of

³ See application at pages 1-4.

⁴ See Buchler at Figure 1; column 5, lines 28-30.

10 Hz.⁵ Delay elements (7-10) are provided to adjust each time an optical recording medium is changed. To account for differences in track depth and the geometry of the optical recording medium as well as the linear scanning speed which may vary for different types of optical recording media.⁶

Conversely, in an exemplary embodiment of the Applicants' claimed advancements, a tracking error detection device for an optical disk apparatus utilizes a modulation coding method in which a minimum value of a run-length is 1. The detecting unit of the device includes at least two detectors and detects a reflected light from a series of pits formed on an optical disk. A phase comparing unit detects a phase difference of outputs of the at least two detectors. A low-pass filter smoothes an output of the phase comparing unit. The cut-off frequency of the low-pass filter is higher than a frequency at which a spectrum of a modulation code recorded in the optical disk becomes -10 dB relative to a frequency component of a code before modulation and lower than a frequency at which the spectrum of the modulation code recorded in the optical disk becomes -5 dB.

The filters (21) and (23) of Buchler are provided for separate functionality. For example, the filter (21) of the phase detector (14) is provided to remove high frequency components from the tracking error (Te) signal. The low-pass filter (23) is provided for maintaining a stable DC drive current for the microcontroller (24). In this regard, Applicants note that the claimed low-pass filter provides a cut-off frequency higher than a frequency at which a spectrum of a modulation code recorded in the optical disk becomes -10 dB relative to a frequency component of a code before modulation and lower than a frequency at which the spectrum of modulation code recorded in the optical disk becomes -5 dB.

⁵ See Buchler at column 4, lines 48-56.

⁶ See Buchler at column 5, lines 12-34.

Buchler does not describe any teachings for a specific cut-off frequency for the filter (21) which relates to the modulation code provided in the optical disk. In this regard, the Official Action cites In re Aller, 105 USPQ 233 in support of the proposition that where the general conditions of a claim are disclosed in the prior art discovering the optimum or workable ranges involves only routine skill in the art. However, the Official Action has failed to demonstrate that Buchler describes the general conditions of the claim. In other words, as Buchler specifically describes delay elements (7-10) which are adjusted in accordance with different recording mediums, such adjustable delay elements are completely inconsistent with the setting of a low-pass filter cut-off frequency value such that the cut-off frequency is higher than a frequency at which a spectrum of a modulation code recorded in the optical disk becomes -10 dB relative to a frequency component of a code before modulation and lower than a frequency at which the spectrum of the modulation code recorded in the optical disk becomes -5 dB. Simply stated, Buchler does not describe the general conditions of the Applicants' claims which are directed toward a cut-off frequency setting related to modulation code of a recording medium. In other words, the general conditions of the Applicants' claimed advancements are directed to a power density spectrum distribution of the modulation code of the information recorded in the optical disk.

For example, as described on page 12, line 20 to page 14, line 10, F_c' is the frequency at which the spectrum of the modulation code becomes -7dB relative to the frequency component of the code before the modulation, and F_c' is about 40 KHz in this case. F_c is the frequency at which the spectrum of the modulation code recorded in the optical disk becomes -11 dB relative to the frequency component of the code before the modulation, and F_c is about 21.2 KHz in this case. A frequency higher than F_c , at an upper end of the range being 60 KHz, at which the spectrum of the modulation code becomes -5dB relative to the frequency component of the code before the modulation, is set to the cut-off frequency in the

embodiment. In the exemplary claimed embodiment the cut-off frequency is in the above-mentioned range. More particularly, dependent Claim 2 recites that the cut-off frequency is at least 40 KHz which is 8 times of the frequency band of the tracking servo apparatus (5 KHz in the embodiment). This is because the cut-off frequency of the low-pass filter and the frequency band of the tracking servo circuit may interfere with each other when the cut-off frequency is close to the frequency band.

Thus, even in the case where the minimum mark length is shortened in order to increase the recording density of the optical disk and the modulation code has a large spectrum in a low-frequency component relative to the channel frequency in order to increase efficiency of the modulation code, the phase difference signal can be smoothed to remove the noise. Thus, the modulation component of the recording code (i.e., the high-frequency component), and the tracking error can be correctly detected.

In contrast, the general conditions of Buchler are directed toward adjusting delay elements in order to account for differences in recording medium types. Not only are the general conditions of Buchler inconsistent with the Applicants' inventive focus, in fact, Buchler teaches away from a filter arrangement in accordance with the Applicants' amended claims.

"A reference may be said to teach away when a person of ordinary skill in the art, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant." In re Gurley, 31 USPQ2d 1130, 1131 (Fed. Cir. 1994). To this end, "disclosures in the references that diverge from and teach away from the invention cannot be disregarded", Phillips Petroleum Company v. U.S. Steel Corp., 9 USPQ2d 1461 (Fed. Cir. 1989).

Accordingly, Applicants respectfully request that the rejection of Claims 1-10 under 35 U.S.C. § 103 be withdrawn.

CONCLUSION

Consequently, in view of the foregoing amendment and remarks, it is respectfully submitted that the present application, including Claims 1, 2, 4-7, 9 and 10 is patentably distinguished over the prior art, in condition for allowance, and such action is respectfully requested at an early date.


Respectfully submitted,

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